



CRITICAL HABITAT DESIGNATION  
FOR THE GULF OF MAINE DPS OF  
ATLANTIC SALMON:  
INITIAL REGULATORY FLEXIBILITY  
AND ENERGY IMPACT ANALYSES

Draft Report | August 2008

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## CHAPTER 1 | INTRODUCTION AND BACKGROUND

## 1.1 INTRODUCTION

1. Under the provisions of the Endangered Species Act (ESA), the National Marine Fisheries Service (NMFS) proposes to designate critical habitat for the Gulf of Maine Distinct Population Segment (DPS) of Atlantic salmon (*Salmo salar*). This DPS is comprised of all Atlantic salmon whose freshwater range occurs in watersheds from the Androscoggin River northward along the Maine coast to the Dennys River. These watersheds encompass a large portion of the State of Maine and a small portion of the State of New Hampshire.
2. This report considers the extent to which the impacts of designating critical habitat for the Gulf of Maine DPS of Atlantic salmon may be borne by small entities or affect the supply, distribution, and use of energy. The report draws on and supplements other analyses of the impacts of critical habitat designation, including:
  - *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon*, Draft Report, prepared for the National Marine Fisheries Service by Industrial Economics, Incorporated, August 2008; and
  - *Biological valuation of Atlantic salmon (Salmo salar) habitat in the Gulf of Maine Distinct Population Segment* (Draft), National Marine Fisheries Service, 2008.

The analysis of potential impacts on small entities is conducted pursuant to the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996, and meets the requirements of an Initial Regulatory Flexibility Analysis (IRFA). The analysis of potential energy impacts is conducted pursuant to Executive Order No. 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use."

3. This chapter provides introductory and background information relevant to the IRFA and energy impact analysis. It begins by summarizing relevant statutory and regulatory information concerning the ESA and critical habitat designation. Next, it briefly describes the species and the activities that may threaten the species' habitat. This discussion is followed by a description of the study area and of the regulatory alternatives considered in both the IRFA and energy impact analysis. The chapter concludes with an overview of the rest of the report.

**1.2 BACKGROUND**

4. A Status Review published in 2006 concluded that the Gulf of Maine DPS should be comprised of all Atlantic salmon whose freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River, including all associated hatchery populations used to supplement natural populations.<sup>1</sup> NMFS has proposed to list this DPS as an endangered species.
5. In accordance with the ESA, NMFS also proposes to designate critical habitat for the Gulf of Maine DPS of Atlantic salmon. Section 4(b)(2) of the ESA requires NMFS to designate critical habitat for threatened and endangered species “on the basis of the best scientific data available and after taking into consideration the economic impact, the impact on national security and any other relevant impact, of specifying any particular area as critical habitat.” This section grants the Secretary of Commerce discretion to exclude any area from critical habitat if (s)he determines “the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat.” The Secretary may not exclude any particular area if exclusion “will result in the extinction of the species.”
6. The ESA defines critical habitat under section 3(5)(A) as:
  - (i) the specific areas within the geographical area occupied by the species, at the time it is listed..., on which are found those physical or biological features (I) essential to the conservation of the species, and (II) which may require special management considerations or protection; and
  - (ii) specific areas outside the geographical area occupied by the species at the time it is listed..., upon a determination by the Secretary that such areas are essential for the conservation of the species.
7. Once critical habitat is designated, section 7 of the ESA requires Federal agencies to consult with NMFS to ensure that any action they authorize, fund, or carry out *will not likely result in the destruction or adverse modification of critical habitat*. NMFS may, through the consultation process, recommend changes to these activities (termed “activities with a Federal nexus”) that would avoid destruction or adverse modification of critical habitat. The economic impacts of critical habitat designation – including impacts on small entities or on the supply, distribution, and use of energy – stem from this process and any modifications to activities implemented as a result of consultation.

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<sup>1</sup> National Marine Fisheries Service and Fish and Wildlife Service, July 2006, *Status Review for Anadromous Atlantic Salmon (Salmo salar) in the United States*.

### 1.3 OVERVIEW OF SPECIES AND POTENTIAL THREATS TO ITS HABITAT

8. The Atlantic salmon is an anadromous fish that typically spends two to three years in freshwater before migrating to the ocean, where it typically spends one to two years before returning to its natal river to spawn.<sup>2</sup> The known historic range of Atlantic salmon in U.S. rivers was from the Housatonic River in the south to the St. Croix River in the north. The distribution of the fish in the U.S. by the mid-20th century, however, was primarily limited to Maine.<sup>3</sup>
9. Threats to the physical or biological features of the salmon's habitat within the DPS' current and historical range may affect the potential for recovery of the species. Based on a review of potential impacts, NMFS has identified the following land use activities that may adversely modify the physical or biological features of critical habitat for the salmon:
  - **Dams** - operation and maintenance of dams and fish passage projects.
  - **Agriculture** - land clearing and use of pesticides, fertilizers, and herbicides.
  - **Changing land use patterns/development** - residential, commercial, and industrial development; discharge of industrial and municipal wastewater.
  - **Transportation and other in-stream construction projects** - construction and maintenance of roads, bridges, or culverts; dredging; bank stabilization; installation and maintenance of vegetation, pilings, moorings, and bulkheads; boat ramp construction or maintenance; construction or repair of pipelines and electric transmission lines; and installation and operation of tidal energy projects.
  - **Silviculture** - land clearing; use of pesticides, fertilizers, and herbicides; and harvest practices.
  - **Aquaculture, hatcheries, and fisheries research** - fish and shellfish stocking and cultivation activities, and biological research on fisheries.
  - **Mining** - peat, sand and gravel, or metals mining.
10. The *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon* considers modifications to these activities that may stem from the designation of critical habitat and estimates the potential costs of these modifications.<sup>4</sup> The IRFA draws on the results of this study

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<sup>2</sup> For a detailed review of biological information, see: National Marine Fisheries Service, November 2005, *Final Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon (Salmo salar)*.

<sup>3</sup> National Marine Fisheries Service and Fish and Wildlife Service, July 2006, *Status Review for the Anadromous Atlantic Salmon (Salmo salar) in the United States*.

<sup>4</sup> For additional information, see *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon*, Draft Report, prepared for the National Marine Fisheries Service by Industrial Economics, Incorporated, August 2008.

to evaluate the potential impact of critical habitat designation on small entities. The energy impact analysis makes similar use of these findings to assess the impact of critical habitat designation on the supply, distribution, and use of energy.

#### 1.4 STUDY AREA

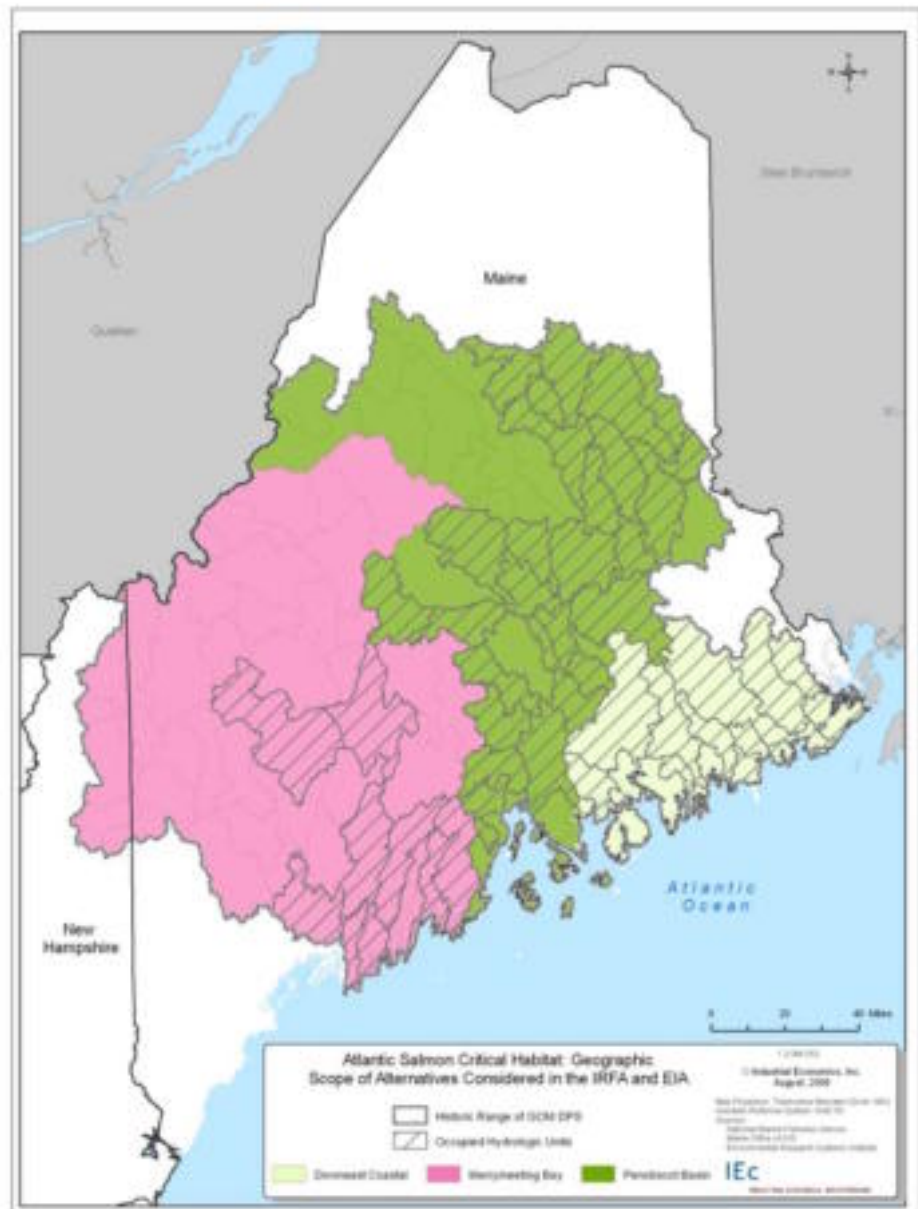
11. The area that NMFS considered in developing its proposed critical habitat designation for the Gulf of Maine DPS of Atlantic salmon (the “study area”) includes the bankfull width or high water mark of approximately 19,200 miles of rivers and perennial streams located in Maine and northeastern New Hampshire. These rivers and streams include the main stems of the Androscoggin, Kennebec, and Penobscot Rivers, as well as their associated tributaries, which extend into 15 of Maine's 16 counties. The study area corresponds to the historic range of the Gulf of Maine DPS.
12. While NMFS proposes to designate critical habitat only within the bankfull width of a river or stream, land use activities outside these areas could have an adverse effect on the salmon or its habitat, and thus could become the focus of a section 7 consultation. For this reason, the *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon* considers all land use activities that may affect the salmon or its habitat, regardless of whether those activities occur within areas that NMFS may formally designate as critical habitat.<sup>5</sup> The IRFA and energy impact analysis presented in this report follow a similar approach, evaluating the impact of critical habitat designation on all land use activities that occur within the watersheds that feed the rivers and streams within the study area.
13. The watersheds evaluated in the IRFA and energy impact analysis include 105 ten-digit hydrological units, each identified by a unique Hydrologic Unit Code (HUC). According to NMFS, 48 of these HUCs are currently occupied by the salmon and contain the physical and biological features essential to conservation of the species.<sup>6</sup> Exhibit 1-1 presents a map of the study area, indicating the location of the occupied and unoccupied HUCs. Consistent with NMFS' recovery planning efforts for the salmon, the map places each of the 105 HUCs into one of three Salmon Habitat Recovery Units (SHRUs): the Downeast Coastal SHRU, the Penobscot Basin SHRU, and the Merrymeeting Bay SHRU.

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<sup>5</sup> *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon*, Draft Report, prepared for the National Marine Fisheries Service by Industrial Economics, Incorporated, August 2008.

<sup>6</sup> National Marine Fisheries Service, *Biological valuation of Atlantic salmon (Salmo salar) habitat in the Gulf of Maine Distinct Population Segment* (Draft), 2008.

EXHIBIT 1-1. MAP OF STUDY AREA



## 1.5 ALTERNATIVES ANALYZED

14. If NMFS took no action to designate critical habitat for the Gulf of Maine DPS of Atlantic salmon, there would be no impact on small entities or on the supply, distribution, and use of energy. NMFS believes, however, that failure to designate critical habitat would be inconsistent with the requirements of the ESA. Accordingly, NMFS considered but rejected the "no action" alternative.

In light of the need for action, NMFS considered three regulatory alternatives. The IRFA and the energy impact analysis consider the impacts of each of these three alternatives:

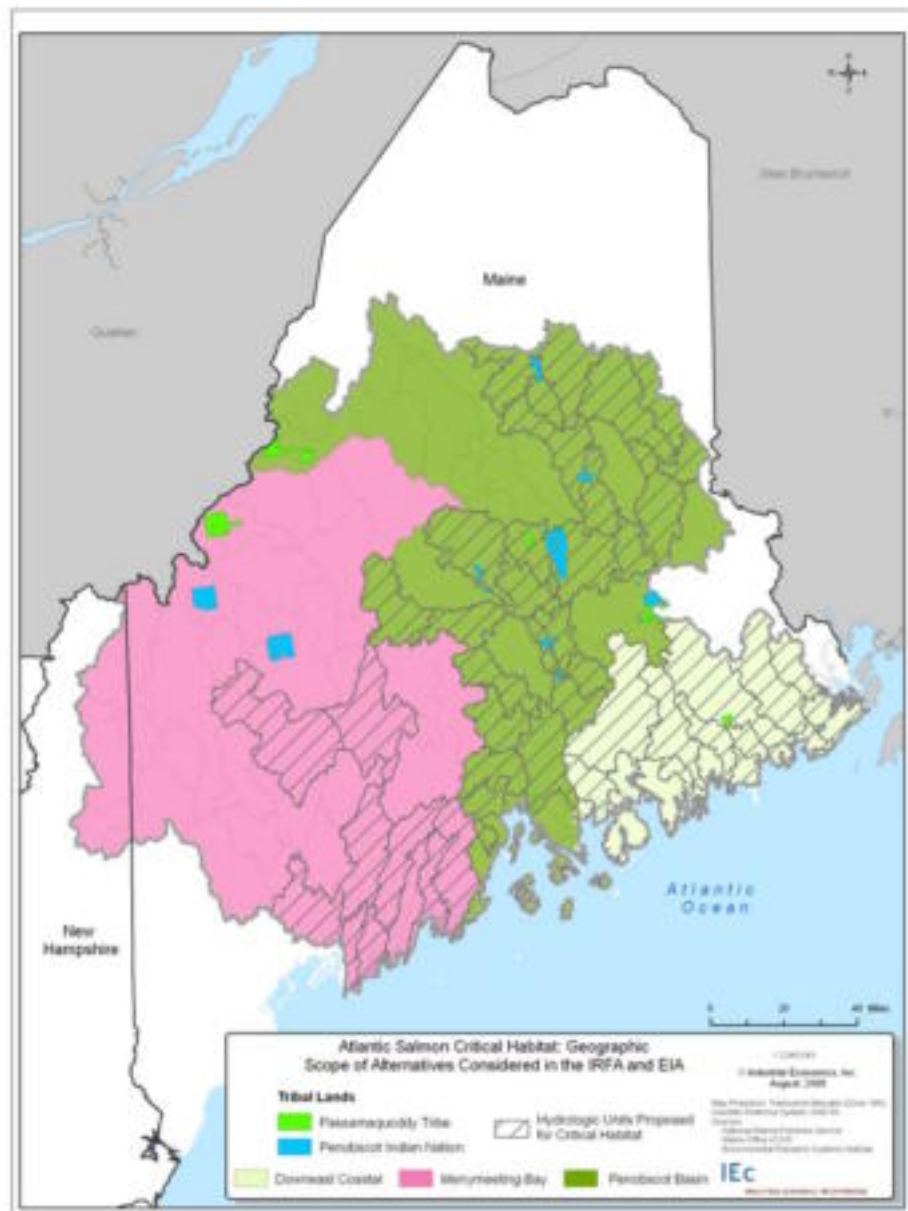
- **Alternative 1** - designating the bankfull width of rivers and perennial streams throughout the 105-HUC study area as critical habitat for the Gulf of Maine DPS of Atlantic salmon. Only 48 of these HUCs, however, are currently occupied by the salmon and contain the physical and biological features essential to conservation of the species. NMFS determined that the 57 HUCs that are currently unoccupied are not essential to conservation of the species. Accordingly, NMFS rejected this alternative.
- **Alternative 2** - designating as critical habitat the bankfull width of rivers and perennial streams within the 48 occupied HUCs. NMFS rejected this alternative because it determined that, in certain cases, the benefits of excluding particular areas outweigh the benefits of including them in the designation, and excluding these areas will not result in extinction of the species.
- **Alternative 3** - limiting the designation of critical habitat to the bankfull width of rivers and perennial streams within 45 of the 48 occupied HUCs, and excluding all Tribal lands from the designation. Exhibit 1-2 indicates the location of the 45 HUCs, and identifies Tribal lands within these HUCs. This is the alternative that NMFS has proposed.

## 1.6 ORGANIZATION OF REPORT

15. The remainder of this report consists of two chapters and an appendix. Chapter 2 presents the IRFA, discussing the potential impact of Alternatives 1, 2, and 3 on small entities. Chapter 3 presents the energy impact analysis, assessing the potential impact of Alternatives 1, 2, and 3 on the supply, distribution, and use of energy. Appendix A provides additional information on potential impacts to small entities, listing estimated impacts by activity and HUC.



## EXHIBIT 1-2. HUCs INCLUDED IN PROPOSED CRITICAL HABITAT DESIGNATION



## CHAPTER 2 | REGULATORY FLEXIBILITY ANALYSIS

## 2.1 INTRODUCTION

1. When a Federal agency proposes regulations that may have a significant impact on a substantial number of small entities, the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996, requires the agency to prepare and make available for public comment an Initial Regulatory Flexibility Analysis (IRFA) that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions).<sup>1</sup> The analysis presented in this chapter meets the requirements for completing an IRFA according to RFA/SBREFA.

## 2.2 SUMMARY OF IMPACTS ON SMALL ENTITIES

2. This IRFA draws on the *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon* to identify potential impacts of interest.<sup>2</sup> The information presented in that report suggests that impacts to the following activities may be borne by small entities:
  - Hydropower;
  - Agriculture; and
  - Development.
3. Exhibit 2-1 summarizes the estimated impacts to small entities described in detail in the remainder of this chapter. The analysis considers three regulatory alternatives:
  - **Alternative 1** - designating the bankfull width of rivers and perennial streams throughout the 105-HUC study area as critical habitat for the Gulf of Maine DPS of Atlantic salmon;
  - **Alternative 2** - designating the bankfull width of rivers and perennial streams within the 48 occupied HUCs as critical habitat for the species; and
  - **Alternative 3** - limiting the designation of critical habitat to the bankfull width of rivers and perennial streams within 45 of the 48 occupied HUCs, and excluding all

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<sup>1</sup> 5 U.S.C. 601 et seq.

<sup>2</sup> For additional information, see *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon*, Draft Report, prepared for the National Marine Fisheries Service by Industrial Economics, Incorporated, August 2008.

Tribal lands from the designation. This is the alternative that NMFS has proposed.

**EXHIBIT 2-1. SUMMARY OF IMPACTS TO SMALL ENTITIES**

REGULATORY ALTERNATIVE	ACTIVITY	ESTIMATED NUMBER OF AFFECTED SMALL ENTITIES	AVERAGE ANNUALIZED COST FOR EACH AFFECTED ENTITY	AVERAGE ANNUAL IMPACT ON A PERCENTAGE BASIS
Alternative 1	Hydropower	Up to 27 dam owners	Variable (Exhibit 2-3)	Variable (Exhibit 2-4)
	Agriculture	107 farms	\$6,800	8% of estimated annual revenues
	Development	Unknown	Unknown	Unknown
Alternative 2	Hydropower	Up to 12 dam owners	Variable (Exhibit 2-3)	Variable (Exhibit 2-4)
	Agriculture	65 farms	\$6,100	8% of estimated annual revenues
	Development	Unknown	Unknown	Unknown
Alternative 3	Hydropower	Up to 11 dam owners	Variable (Exhibit 2-3)	Variable (Exhibit 2-4)
	Agriculture	62 farms	\$6,000	8% of estimated annual revenues
	Development	Unknown	Unknown	Unknown

4. While the *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon* evaluates potential impacts on other land use activities, these impacts are either not forecast or not expected to affect small entities. For example, potential impacts on transportation projects are limited to the administrative costs of considering salmon critical habitat during project-specific section 7 consultations. These impacts are expected to be borne by State (Maine Department of Transportation) and Federal (U.S. Army Corps of Engineers) agencies, which are not small entities. In contrast, impacts on potential tidal energy projects may be borne by a small business, Oceana Energy Company, the parent of Maine Tidal Energy Company.<sup>3</sup> Oceana, however, has yet to make available specific plans for its projects in Maine. The potential impact of these projects on salmon habitat remains uncertain, as does the nature of any project modifications that NMFS might request. In light of these uncertainties, the IRFA does not evaluate potential impacts on Oceana.

<sup>3</sup> The small business threshold for energy producers such as Oceana Energy Company is the production of less than four billion kilowatt-hours (KW hours) annually. Oceana currently controls seven subsidiary companies (Oceana Energy Company. "Group Structure," accessed at [http://www.oceanaenergy.com/group\\_structure.htm](http://www.oceanaenergy.com/group_structure.htm) on March 3, 2008), which in aggregate hold eleven preliminary permits for tidal energy projects; an application for a twelfth permit is pending before the Federal Energy Regulatory Commission. These projects are spread across the country. While the preliminary permits enable Oceana to explore the environmental and economic feasibility of developing tidal power infrastructure at the sites, the company is not currently producing any power.

5. As described in the *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon*, no impacts on silviculture, aquaculture, and mining activities are forecast. The remainder of this IRFA therefore focuses on describing the extent to which the impacts of critical habitat designation on hydropower, agriculture, and development activities may be borne by small entities.

### 2.3 INITIAL REGULATORY FLEXIBILITY ANALYSIS

6. This IRFA is intended to improve NMFS' understanding of the potential effects of the designation of critical habitat on small entities, and to identify opportunities to minimize these impacts. Exhibit 2-2 describes the components of an IRFA. The remainder of this section addresses each of these IRFA requirements.

#### EXHIBIT 2-2. ELEMENTS OF AN IRFA

ELEMENTS OF AN INITIAL REGULATORY FLEXIBILITY ANALYSIS	
1.	A description of the reasons why the action by the agency is being considered.
2.	A succinct statement of the objectives of, and legal basis for, the proposed rule.
3.	A description – and, where feasible, an estimate of the number – of small entities to which the rule will apply.
4.	A description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirement and the types of professional skills necessary for the preparation of the report or record.
5.	An identification, to the extent practicable, of all relevant Federal rules that may duplicate, overlap, or conflict with the proposed rule.
6.	A description of alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities.
Source: Small Business Administration, Office of Advocacy. May 2003. A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act. pg. 32.	

#### 2.3.1 REASONS FOR CONSIDERING THE PROPOSED ACTION

7. Section 4(a)(3) of the Endangered Species Act (ESA) requires NMFS and the U.S. Fish and Wildlife Service to designate critical habitat for threatened and endangered species to the maximum extent prudent and determinable.<sup>4</sup> Given its proposal to list the expanded Gulf of Maine DPS of Atlantic salmon as endangered, NMFS finds that consideration of critical habitat designation is required.

#### 2.3.2 OBJECTIVES AND LEGAL BASIS OF THE PROPOSED RULE

8. The purpose of the proposed rule is to designate critical habitat for the Gulf of Maine DPS of Atlantic salmon pursuant to the ESA. As noted above, the ESA requires NMFS to designate critical habitat for threatened and endangered species to the maximum extent

<sup>4</sup> 16 U.S.C. Sections 1531-1544.

prudent and determinable. Section 4(b)(2) of the ESA requires that NMFS designate critical habitat "on the basis of the best scientific data available and after taking into consideration the economic impact, the impact on national security, and any other relevant impacts, of specifying any particular area as critical habitat." This section grants the Secretary [of the Interior or of Commerce] discretion to exclude any area from critical habitat if (s)he determines "the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat." The Secretary may not exclude areas if so doing "will result in the extinction of the species."

### 2.3.3 AFFECTED ENTITIES AND PROJECTED COMPLIANCE REQUIREMENTS

#### 9. Three types of small entities are defined in the RFA:

- **Small Business** - Section 601(3) of the RFA defines a small business as having the same meaning as small business concern under section 3 of the Small Business Act. This includes any firm that is independently owned and operated and is not dominant in its field of operation. The U.S. Small Business Administration (SBA) has developed size standards to carry out the purposes of the Small Business Act; these size standards can be found in 13 CFR 121.201. For the purpose of establishing size standards, industries are defined according to the North American Industry Classification System (NAICS). The SBA definition of a small business applies to a firm's parent company and all affiliates as a single entity.
- **Small Governmental Jurisdiction** - Section 601(5) defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with a population of less than 50,000. Special districts may include those with responsibility for irrigation, ports, parks and recreation, sanitation, drainage, soil and water conservation, road assessment, etc. When counties have populations greater than 50,000, those municipalities of fewer than 50,000 can be identified using population reports. Other types of small government entities are not as easily identified under this standard, as they are not typically classified by population.
- **Small Organization** - Section 601(4) defines a small organization as any not-for-profit enterprise that is independently owned and operated and not dominant in its field. Small organizations may include private hospitals, educational institutions, irrigation districts, public utilities, agricultural co-ops, etc. Depending upon State laws, it may be difficult to distinguish whether a small entity is a government or non-profit entity. For example, a water supply entity may in one case be a cooperative owned by its members, and in another a publicly chartered small government with the assets owned publicly and officers elected at the same elections as other public officials.

10. This IRFA focuses on small entities that may bear the regulatory costs quantified in the *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon*, including impacts to small entities associated with the following activities:

- **Hydropower** – small businesses engaged in hydropower production;
- **Agriculture** – small farms; and
- **Development** – small subdividers.

Consistent with the overall economic analysis, the IRFA concentrates on the direct impacts of critical habitat designation on these entities.

11. As noted in Chapter 2 of the *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon*, the designation of critical habitat may, under certain circumstances, lead to indirect effects on economic behavior. These effects are not intentional; nonetheless, if they occur as a result of critical habitat designation, they are appropriately considered an incremental impact of the regulation.
12. A potential indirect effect of critical habitat designation is to encourage landowners to develop Habitat Conservation Plans (HCPs). Under section 10 of the ESA, landowners seeking an incidental take permit must develop an HCP to counterbalance the potential harmful effects that an otherwise lawful activity may have on a species. The purpose of the habitat conservation planning process is to ensure that the effects of incidental take are adequately minimized and mitigated. Thus, HCPs are developed to ensure compliance with section 9 of the ESA and to meet the requirements of section 10 of the ESA.
13. Application for an incidental take permit and completion of an HCP are not required or necessarily recommended by NMFS as a result of critical habitat designation. In certain situations, however, the new information provided by the proposed critical habitat rule may prompt a landowner to apply for an incidental take permit. For example, a landowner may have been previously unaware of the potential presence of the species on his or her property, and expeditious completion of an HCP may offer the landowner regulatory relief in the form of exclusion from the final critical habitat designation. In this case, the effort involved in creating the HCP and undertaking associated conservation actions is considered an incremental effect of designation.
14. Neither this IRFA nor the *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon* forecast potential indirect effects, including effects associated with the development of HCPs. NMFS is soliciting comment on such impacts, particularly with respect to the development of HCPs by small entities.

#### 2.3.4 NUMBER OF SMALL ENTITIES TO WHICH THE RULE WILL APPLY

15. The number of small entities that would be affected by the designation of critical habitat for the Gulf of Maine DPS of Atlantic salmon depends upon the extent of the area

designated. Under Alternative 1, which would designate critical habitat throughout the historic range of the DPS, an estimated 27 small hydropower producers and 107 small farms may be affected. Under Alternative 2, which would designate critical habitat within the 48 currently occupied HUCs, an estimated 12 small hydropower producers and 65 small farms may be affected. Alternative 3 would limit the designation of critical habitat to 45 of the 48 occupied HUCs, and would exclude all Tribal lands from the designation. Under this alternative, an estimated 11 small hydropower producers and 62 small farms may be affected. The discussion below describes the derivation of these estimates.

#### 2.3.4.1 Hydropower

16. Chapter 3 of the *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon* estimates potential impacts to all 103 hydropower projects located within the study area. Forty unique entities or combinations of entities own and operate these dams. The impact of capital and programmatic improvements at hydropower projects are expected to be borne by these owners and operators.
17. The IRFA focuses on small hydropower producers, which the SBA defines as those generating less than four billion kilowatt-hours (KW hours) of electricity annually. This definition, along with other considerations, eliminates 13 of the 40 potentially affected dam owners and operators from the analysis. Specifically:
  - One entity owns only dams already planned for removal and is therefore not expected to experience impacts associated with critical habitat designation.<sup>5</sup>
  - Two dam owners are agencies of the State of New Hampshire.<sup>6</sup>
  - Ten dam owners are not small businesses because they either operate above the threshold for small hydropower operators or because they are subsidiaries of businesses that operate above their small business thresholds.<sup>7</sup>
18. The discussion therefore focuses on the remaining 27 hydropower producers, which are considered small entities for purposes of this analysis. Exhibit 2-3 identifies each of these dam owners, providing information on the installed capacity of their projects within the study area, estimated annual generation based on installed capacity, and the potential economic impacts of critical habitat designation under each alternative. As Exhibit 2-3 indicates, the designation of critical habitat under Alternative 1 would affect 27 small

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<sup>5</sup> PPL Great Works, LLC owns only the Great Works Dam. As described in Chapter 3 of the *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon*, this dam is currently slated for removal.

<sup>6</sup> The New Hampshire Department of Environmental Services and Public Services of New Hampshire are State agencies, and thus are not considered small entities under RFA/SBREFA.

<sup>7</sup> FPL Energy Maine, LLC; Great Lakes Hydro America LLC; Rumford Falls Hydro LLC; Verso Androscoggin; Madison Paper Industries; PPL Maine, LLC; GNE, LLC; DaimlerChrysler Financial Services Americas LLC; Benton Falls Hydro Associates; and Errol Hydroelectric Co. LLC/FPL Energy Maine LLC are not considered small businesses based on company operating profiles.



dam owners, who operate a total of 48 dams within the affected area. In contrast, Alternative 2 would affect 12 small dam owners and 16 dams, while Alternative 3 would affect 11 small dam owners and 11 dams.

19. Based solely on the IRFA's estimates of the power generated by hydropower projects within the study area, each of the entities listed in Exhibit 2-3 qualifies as a small business (i.e., each generates less than four billion KW hours annually). It is unlikely, however, that all of these businesses operate only within the study area, or only within the hydropower sector. Some of the affected entities, for example, may be subsidiaries of manufacturing enterprises that produce hydroelectric power primarily for their own use. To the extent that these businesses operate in either a broader geographic region or within other industries, Exhibit 2-3 may overstate the number of potentially affected small entities. If, however, the dam owners do not derive revenue from other sources, these entities are appropriately considered small businesses.
20. To evaluate the potential impacts of critical habitat designation on these businesses, Exhibit 2-4 estimates the hydropower-related revenue associated with the projects in the study area and measures annualized impacts as a percentage of that revenue. Under each alternative, one or more dam owners are forecast to experience annualized impacts that approach or exceed their estimated annual revenues. These high percentages may be a result of a number of simplifying assumptions made within the analysis. As described in the *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon*, the analysis assumes that each project within the area designated as critical habitat will incorporate project modifications, such as fish ladders or lifts, as a result of section 7 consultation. In some cases, such modifications may not be necessary. Moreover, the estimated cost of such modifications is based on the average cost of similar modifications at other facilities. These averages may not be representative of the costs that might be incurred within the study area, particularly at small facilities. Nonetheless, the comparison suggests that at some facilities, the cost of potential project modifications could threaten the operation's continued economic viability. In light of these findings, NMFS is soliciting comment on the economic impacts of critical habitat designation on hydropower producers.



## EXHIBIT 2-3. ESTIMATED IMPACTS TO SMALL HYDROPOWER PRODUCERS

DAM OWNER	INSTALLED CAPACITY OF DAMS IN STUDY AREA (KW)	ESTIMATED ANNUAL GENERATION <sup>1</sup> (KW HOURS)	ANNUALIZED IMPACTS TO DAM OWNER <sup>3</sup> (7%)		
			ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
Miller Hydro Group	19,400	108,903,394	\$17	\$17	\$17
Hydro Kennebec Ltd. Partnership	15,433	86,634,334	\$19,500	\$19,500	\$19,500
Bangor Pacific Hydro Associates	13,000	72,976,501	\$148,000	\$148,000	\$148,000
Ridgewood Maine Hydro Partners	8,755	49,146,867	\$452,000	\$336	\$168
Merimil Ltd. Partnership	6,550	36,768,930	\$112	\$112	\$112
Messalonskee Stream Hydro LLC	6,200	34,804,178	\$487,000	\$0	\$0
Androscoggin Reservoir Co.	5,311	29,813,708	\$12,800	\$0	\$0
Brassua Hydro Ltd. Partnership	4,180	23,464,752	\$37,700	\$0	\$0
City of Lewiston	1,695	9,515,013	\$129,000	\$129,000	\$129,000
Express Hydro Services	1,100	6,174,935	\$146,000	\$61	\$61
Kennebago Corp.	900	5,052,219	\$292,000	\$0	\$0
Sebec Hydro Co.	867	4,866,971	\$97,300	\$0	\$0
Kennebec Water District	800	4,490,862	\$12,800	\$0	\$0
Green Lake Water Power Co.	500	2,806,789	\$97,300	\$97,300	\$97,300
Hackett Mills Hydro Associates	485	2,722,585	\$104,000	\$0	\$0
Goose River Hydro Co.	369	2,071,410	\$653,000	\$507,000	\$0
F&B Wood Corporation	350	1,964,752	\$146,000	\$0	\$0
Christopher Anthony	300	1,684,073	\$146,000	\$0	\$0
Moosehead Manufacturing	300	1,684,073	\$98	\$98	\$98
J. Bertl/V. LaNoce	160	898,172	\$117,000	\$0	\$0
Joseph Sawyer	94	527,676	\$146,000	\$0	\$0
John Crouch & Sons	93	522,063	\$23,500	\$0	\$0
Raymond Fortier	85	477,154	\$146,000	\$168	\$168
Small Hydro East	65	364,883	\$86,400	\$0	\$0
Dale Davis	50	280,679	\$136,000	\$0	\$0
Peter Graham	15	84,204	\$127,000	\$127,000	\$127,000
Kennebec Water Power Co. <sup>2</sup>	-	-	\$129,000	\$0	\$0
<sup>1</sup> Estimated annual generation was calculated using 2006 data on the utilization of Maine's hydropower capacity. In 2006, 766,000 KW of installed capacity at hydropower projects in Maine generated 4.3 billion KW hours of power. This is equivalent to approximately 5,614 KW hours for every KW of installed capacity. The analysis uses this figure to estimate the KW hours of electricity generated at facilities owned by each of the entities listed above. <sup>2</sup> All projects owned within the study area are storage projects with unknown installed capacities. <sup>3</sup> Estimated impacts are annualized over the time horizon of the analysis, 50 years, at a discount rate of seven percent.					

EXHIBIT 2-4. IMPACTS OF CRITICAL HABITAT DESIGNATION AS A PERCENT OF HYDROPOWER-RELATED REVENUE

DAM OWNER	ESTIMATED HYDROPOWER REVENUE <sup>1</sup> (\$/YEAR)	IMPACT AS A PERCENT OF ESTIMATED REVENUE <sup>2</sup>		
		ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
Miller Hydro Group	\$13,200,000	0.00%	0.00%	0.00%
Hydro Kennebec Ltd. Partnership	\$10,500,000	0.19%	0.19%	0.19%
Bangor Pacific Hydro Associates	\$8,850,000	1.67%	1.67%	1.67%
Ridgewood Maine Hydro Partners	\$5,960,000	7.58%	0.01%	0.00
Merimil Ltd. Partnership	\$4,460,000	0.00%	0.00%	0.00%
Messalonskee Stream Hydro LLC	\$4,220,000	11.6%	0.00%	0.00%
Androscoggin Reservoir Co.	\$3,620,000	0.35%	0.00%	0.00%
Brassua Hydro Ltd. Partnership	\$2,850,000	1.32%	0.00%	0.00%
City of Lewiston	\$1,150,000	11.2%	11.2%	11.2%
Express Hydro Services	\$749,000	19.5%	0.01%	0.01%
Kennebago Corp.	\$613,000	47.7%	0.00%	0.00%
Sebec Hydro Co.	\$590,000	16.5%	0.00%	0.00%
Kennebec Water District	\$545,000	2.35%	0.00%	0.00%
Green Lake Water Power Co.	\$340,000	28.6%	28.6%	28.6%
Hackett Mills Hydro Associates	\$330,000	31.5%	0.00%	0.00%
Goose River Hydro Co.	\$251,000	260%	202%	0.00%
F&B Wood Corporation	\$238,000	61.3%	0.00%	0.00%
Christopher Anthony	\$204,000	71.5%	0.00%	0.00%
Moosehead Manufacturing	\$204,000	0.05%	0.05%	0.05%
J. Bertl/V. LaNoce	\$109,000	107%	0.00%	0.00%
Joseph Sawyer	\$64,000	228%	0.00%	0.00%
John Crouch & Sons	\$63,300	37.1%	0.00%	0.00%
Raymond Fortier	\$57,900	253%	0.29%	0.29%
Small Hydro East	\$44,200	195%	0.00%	0.00%
Dale Davis	\$34,000	400%	0.00%	0.00%
Peter Graham	\$10,200	1240%	1240%	1240%
Kennebec Water Power Co. <sup>3</sup>	-	N/A	N/A	N/A
<sup>1</sup> Estimated hydropower revenue is calculated using the average revenue generated per KW Hour of electricity in Maine, \$0.12/KW Hour (Energy Information Administration. "Table 8. Retail Sales, Revenue, and Average Retail Price by Sector, 1990 Through 2006." Accessed at <a href="http://www.eia.doe.gov/cneaf/electricity/st_profiles/sept08me.xls">www.eia.doe.gov/cneaf/electricity/st_profiles/sept08me.xls</a> on August 20, 2008.). <sup>2</sup> Calculated by dividing the annualized economic impacts described in Exhibit 2-3 by the annual revenues shown in Column 2. <sup>3</sup> All projects owned within the study area are storage projects. The information required to estimate annual impacts is not available.				

## 2.3.4.2 Agriculture

21. Chapter 4 of the *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon* considers the extent to which agricultural activities may be affected by critical habitat designation for the salmon. Exhibit 2-5 provides information on the prevalence of small agricultural operations in Maine and New Hampshire in the counties overlapping the study area.
22. As evidenced in this exhibit, nearly all of the farms operating within the study area are considered small. Therefore, the analysis assumes that all potentially affected farms are small. In total, 1,189 small farms are in counties located, at least in part, within the study area. To estimate the number of small farms potentially affected by the designation of critical habitat under each alternative, the analysis employs the following steps:
- **Within each county, estimate the percentage of the counties' total agricultural land that occurs within the study area.** This step involved a GIS analysis of the counties' agricultural lands and the boundaries of the study area.
  - **Estimate the percentage of farms within each county receiving government assistance.** The derivation of this percentage is provided in Chapter 4 of the *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon*. This percentage was developed to determine the number of farms potentially subject to section 7 consultation for the salmon.
  - **Estimate the total number of small businesses that are potentially affected under Alternatives 1, 2, and 3.** This step involved multiplying the total number of small farms within each county by the percentage receiving government payments and the percentage of farmland within the county that is located within one of the 105 HUCs that encompass the historic range of the DPS (Alternative 1), one of the 48 currently occupied HUCs identified under Alternative 2, or one of the 45 HUCs (excluding Tribal lands) in which critical habitat would be designated under Alternative 3.
23. According to this analysis, the designation of critical habitat under Alternative 1 would affect an estimated 107 small farms. This is roughly nine percent of all small farms within the study area. In contrast, an estimated 65 small farms may be affected under Alternative 2. Under Alternative 3, the estimated number of potentially affected small farms is 62. In each case, all potentially affected farms are located in Maine. None are located in New Hampshire.

EXHIBIT 2-5. SMALL FARMS IN THE MAINE AND NEW HAMPSHIRE COUNTIES OVERLAPPING THE STUDY AREA

NAICS CODE - INDUSTRY (SMALL BUSINESS SIZE STANDARD)		COUNTY																	
		Androscoggin	Aroostook	Cumberland	Franklin	Hancock	Kennebec	Knox	Lincoln	Oxford	Penobscot	Piscataquis	Sagadahoc	Somerset	Waldo	Washington	Coos, NH	Total	% Small
Agriculture-Related Industries																			
111 - Crop Production (Average Annual Receipts <\$750,000)	Total	32	202	87	20	39	44	29	33	40	84	12	14	39	38	31	24	768	
	Small	32	202	87	20	39	44	29	33	39	84	12	14	39	38	31	24	767	99.9%
112 - Animal Production (Average Annual Receipts <\$750,000)	Total	42	18	43	23	10	45	18	20	15	58	10	9	45	40	19	9	424	
	Small	42	18	43	23	10	45	17	19	15	58	10	9	45	40	19	9	422	99.5%
NOTE: Size standard based on SBA's Table of Small Business Size Standards for NAICS 2002 ( <a href="http://www.sba.gov/size/sizetable2002.pdf">http://www.sba.gov/size/sizetable2002.pdf</a> ). Numbers of businesses are based on Dun and Bradstreet Business Information, "Dun's Market Identifiers," downloaded February 2008.																			

24. To characterize potential impacts to small farms, the estimated number of small farms affected under each regulatory alternative is multiplied by an estimate of the average impact per farm. These impacts include the foregone revenues associated with removing agricultural land from production (i.e., land located within 30 meters of a perennial stream) and the annualized cost of developing alternative water supplies.<sup>8</sup> Under Alternative 1, average annual impacts are estimated at approximately \$6,800 per farm; under Alternatives 2 and 3, this estimate is approximately \$6,100 and \$6,000, respectively. The difference in average impacts reflects variation across HUCs in the percentage of cropland that might be removed from production.
25. The costs estimated above represent a relatively significant portion of the total annual revenue that small farms are likely to generate. The average annual revenue for farms located in counties within the 105-HUC study area is approximately \$84,000. Accordingly, under Alternative 1, the estimated impact to small farms represents approximately eight percent of total annual revenues. Within counties that overlap the 48 HUCs considered under Alternative 2, the annual revenue per farm averages approximately \$76,000. Within counties that overlap the 45 HUCs considered under Alternative 3, the annual revenue per farm averages approximately \$74,000. Thus, as with Alternative 1, impacts to small farms under Alternatives 2 and 3 would represent roughly eight percent of total annual revenue. In light of these findings, NMFS is soliciting comment on the economic impacts of critical habitat designation on small farms.

#### 2.3.4.3 Development

26. Chapter 5 of the *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon* quantifies potential impacts to landowners associated with constraints on development within a 30-meter buffer of streams within the study area. The present value of estimated impacts is \$94.6 million to \$127 million. Because impacts are calculated on a per acre basis and not for specific projects, the analysis does not identify who the affected landowners may be, nor can other sources provide this information. Some portion of the landowners are likely individuals (i.e., residential landowners), not businesses, and therefore not relevant to the small business analysis. It is also likely, however, that some potentially affected landowners are businesses, including small businesses. In this case, the impacts of constraints on development may be borne by small businesses.
27. Land developers and subdividers are one type of small business that may be affected by constraints on development. The available data suggest that 201 small land developers and subdividers operate in counties that overlap the 105-HUC study area; this is 98 percent of the total number of subdividers operating in the region. Under Alternative 1, each of these entities could be affected by the designation of critical habitat. Under Alternative 2, the potential impact on development would be limited

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<sup>8</sup> For the purposes of this analysis, the annualized costs of developing alternative water supplies are estimated using a seven percent annual discount rate.

to activities within the 48 HUCs currently occupied by the salmon. The available data suggest that 188 small subdividers and developers operate in counties that overlap these HUCs, accounting for 97 percent of subdividers in the region. Under Alternative 3, the potential impact on development would be limited to activities within the 45 HUCs where NMFS proposes to designate critical habitat; again, 188 small developers and subdividers operate in counties that overlap these HUCs, accounting for 97 percent of subdividers in the region.<sup>9</sup> Thus, the number of potentially affected small subdividers under each alternative is similar, although the magnitude of potential impacts would likely be smaller under Alternatives 2 and 3. The information available, however, is insufficient to estimate impacts on these entities, or to identify other potentially affected landowners. In light of these findings, NMFS is soliciting comment on the economic impacts of critical habitat designation on small developers and subdividers.

#### 2.3.5 DUPLICATIVE, OVERLAPPING, OR CONFLICTING FEDERAL RULES

28. An IRFA must identify any Federal rules that duplicate, overlap, or conflict with the proposed rule. Rules are duplicative or overlapping if they are based on the same or similar reasons for the regulation, the same or similar regulatory goals, and if they regulate the same classes of industry. Rules are conflicting when they impose two conflicting regulatory requirements on the same classes of industry.<sup>10</sup>
29. The protection of listed species and habitat may overlap other sections of the ESA. The protections afforded to threatened and endangered species and their habitat are described in sections 7, 9, and 10 of the ESA. While the designation of critical habitat would affect activities that are funded, authorized, or carried out by a Federal agency, section 7 also requires Federal agencies to consult with the Service to ensure that any of these actions will not likely jeopardize the continued existence of any endangered or threatened species. While efforts that might be undertaken to avoid destruction or adverse modification of critical habitat may overlap with steps that would be taken to avoid jeopardizing the species' continued existence, this analysis attempts to provide an estimate of the incremental impacts of designating critical habitat for the Gulf of Maine DPS of Atlantic salmon.

#### 2.3.6 ALTERNATIVES THAT MINIMIZE IMPACTS ON SMALL ENTITIES

30. NMFS identified 105 watersheds (HUCs) organized into three salmon habitat recovery units (SHRUs) as the study area for the analysis. Under Alternative 1, NMFS would designate the bankfull width of rivers and perennial streams within these 105 watersheds as critical habitat for the Gulf of Maine DPS of Atlantic salmon. Only 48 of these HUCs, however, are currently occupied by the salmon and

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<sup>9</sup> Small Business Administration, "Table of Small Business Size Standards" for NAICS Code 237210 - Subdividers; Dun and Bradstreet, "Dun's Market Identifiers."

<sup>10</sup> Small Business Administration, Office of Advocacy, *A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act*, May 2003, p. 37.

contain the physical and biological features essential to conservation of the species. NMFS determined that the 57 HUCs that are currently unoccupied are not essential to conservation of the species. Accordingly, NMFS rejected this alternative.

31. Under Alternative 2, NMFS would designate as critical habitat the bankfull width of rivers and perennial streams within the 48 occupied HUCs. NMFS rejected this alternative because it determined that, in certain cases, the benefits of excluding particular areas outweigh the benefits of including them in the designation, and excluding these areas will not result in extinction of the species. This is consistent with the provisions of the ESA.
32. Alternative 3 reflects the approach described above, and is the approach that NMFS has proposed. Under this alternative, NMFS would limit the designation of critical habitat to 45 of the 48 occupied HUCs, and would exclude all Tribal lands from the designation. As the preceding analysis notes, this approach would reduce the estimated number of small farms affected by the rule to 62, and the estimated number of affected small hydropower producers to 11.<sup>11</sup> It is likely that Alternative 3 would also reduce potential impacts on small real estate developers. The potential magnitude of these impacts, however, is unknown.

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<sup>11</sup> Appendix A provides additional information, presenting estimated impacts by activity and HUC for each alternative.

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## CHAPTER 3 | ENERGY IMPACT ANALYSIS

## 3.1 INTRODUCTION

1. Pursuant to Executive Order No. 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” issued May 18, 2001, Federal agencies must prepare and submit a “Statement of Energy Effects” for all “significant energy actions.” The purpose of this requirement is to ensure that all Federal agencies “appropriately weigh and consider the effects of the Federal Government’s regulations on the supply, distribution, and use of energy.”<sup>1</sup>
2. The Office of Management and Budget provides guidance for implementing this Executive Order, outlining nine outcomes that may constitute “a significant adverse effect” when compared with the regulatory action under consideration:
  - Reductions in crude oil supply in excess of 10,000 barrels per day (bbls);
  - Reductions in fuel production in excess of 4,000 barrels per day;
  - Reductions in coal production in excess of 5 million tons per year;
  - Reductions in natural gas production in excess of 25 million Mcf per year;
  - Reductions in electricity production in excess of 1 billion kilowatts-hours per year or in excess of 500 megawatts of installed capacity;
  - Increases in energy use required by the regulatory action that exceed the thresholds above;
  - Increases in the cost of energy production in excess of one percent;
  - Increases in the cost of energy distribution in excess of one percent; or
  - Other similarly adverse outcomes.<sup>2</sup>
3. Two of these criteria are relevant to analyzing the potential effects of critical habitat designation for the Gulf of Maine Distinct Population Segment (DPS) of Atlantic salmon: 1) reductions in electricity production in excess of one billion kilowatt-hours per year or in excess of 500 megawatts of installed capacity; and 2) increases in the cost of energy production in excess of one percent. Below, the analysis determines whether impacts on hydroelectric capacity or production are likely to constitute “a significant adverse effect”

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<sup>1</sup> Mitchell E. Daniels, Jr., Director, Office of Management and Budget, “Guidance For Implementing E.O. 13211,” Memorandum For Heads of Executive Departments and Agencies, and Independent Regulatory Agencies, M-01-27, July 13, 2001, <http://www.whitehouse.gov/omb/memoranda/m01-27.html>.

<sup>2</sup> Ibid.



as a result of critical habitat designation for the salmon. The analysis considers three regulatory alternatives:

- **Alternative 1** - designating the bankfull width of rivers and perennial streams throughout the 105-HUC study area as critical habitat for the Gulf of Maine DPS of Atlantic salmon;
- **Alternative 2** - designating the bankfull width of rivers and perennial streams within the 48 occupied HUCs as critical habitat for the species; and
- **Alternative 3** - limiting the designation of critical habitat to the bankfull width of rivers and perennial streams within 45 of the 48 occupied HUCs, excluding all Tribal lands. This is the alternative that NMFS has proposed.

4. The analysis of potential energy impacts is based on the estimate of impacts on hydropower operations presented in the *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon*.<sup>3</sup> The estimate of impacts provided in that report assumes that dams located in critical habitat will be modified to incorporate fish ladders or fish lifts as a result of the designation; the analysis assumes that these project modifications will be undertaken when the dams are scheduled for relicensing. As the report notes, the relicensing of hydropower facilities is subject to the requirements of the Clean Water Act and the Federal Power Act, as well as the requirements of section 7 of the Endangered Species Act (ESA). Hydropower facility owners/operators must consider the impacts of their actions on listed species regardless of the implementation of section 7 of the ESA. The probability that fish passage will be required, however, is expected to increase significantly with the designation of critical habitat. Thus, the energy impacts analysis attributes the costs of providing fish passage to the designation of critical habitat. This is a conservative approach to determining whether critical habitat designation is likely to have a significant energy impact.

### 3.2 POTENTIAL REDUCTION IN ELECTRICITY PRODUCTION OR INSTALLED CAPACITY

5. As specified above, a reduction in installed capacity of more than 500 megawatts (MW) or a reduction in power generation of more than 1 billion kilowatt-hours (KW hours) would constitute a significant adverse effect on energy production. Analysis of the alternatives described above, however, suggests that a significant adverse effect with respect to either of these criteria is unlikely.

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<sup>3</sup> For additional information, see *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon*, Draft Report, prepared for the National Marine Fisheries Service by Industrial Economics, Incorporated, August 2008.

### 3.2.1 POTENTIAL IMPACT ON INSTALLED CAPACITY

6. Installed capacity is “the total manufacturer-rated capacity for equipment such as turbines, generators, condensers, transformers, and other system components,” and represents the maximum rate of flow of energy from the plant or the maximum output of the plant.<sup>4</sup> The total installed capacity of the hydropower dams within the study area is 665 MW. Subtracting the installed capacities of the three dams currently slated for removal (Fort Halifax, Great Works, and Veazie), the installed capacity relevant to this analysis is 639 MW.
7. Alternative 1 would designate critical habitat throughout the historic range of the DPS. Thus, this alternative could affect operations at all dams associated with the 639 MW of generating capacity in question. Approximately 75 percent (477 MW) of this capacity, however, is associated with dams on the main stems of the Kennebec, Androscoggin, or Penobscot Rivers. The dams along these rivers are primarily run-of-river operations (in general, inflow equals outflow). While NMFS might request the provision of fish passage at these dams (e.g., installation of fish ladders or lifts), it does not anticipate that removal of the dams or changes in flow regimes that would significantly reduce their effective capacity would be necessary.<sup>5</sup> This is not necessarily the case for the dams that account for the remaining 25 percent of capacity; at these facilities, changes in flow regimes that would reduce the effective capacity of a dam might be considered. The installed capacity of all of the remaining dams, however, is only 162 MW, well under the 500 MW threshold. Thus, Alternative 1 is unlikely to result in a reduction in installed capacity that would constitute a significant adverse effect.
8. Alternative 2 would designate critical habitat within the 48 HUCs that are currently occupied by Atlantic salmon and contain the physical and biological features essential to conservation of the species. The total installed capacity of the hydropower dams within these HUCs is only 191 MW. Even total elimination of this capacity – which NMFS does not anticipate – would fall short of the 500-MW threshold. Thus, Alternative 2 would not have a significant adverse effect on power generating capacity.
9. Alternative 3 would limit the designation of critical habitat to 45 of the 48 occupied HUCs, and would exclude all Tribal lands from the designation. The total installed capacity of the hydropower dams within the area that would be designated under this alternative is 190 MW. As was the case with Alternative 2, this figure falls well short of the 500-MW threshold for a significant energy impact. Thus, Alternative 3 would not have a significant adverse effect on power generating capacity.

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<sup>4</sup> California Power Plants, In-State Installed Capacity and Dependable Capacity, California Energy Commission, <http://www.energy.ca.gov/electricity/capacity.html>.

<sup>5</sup> Personal communication with Dan Kircheis and Jeff Murphy, National Marine Fisheries Service, on January 8, 2008.

### 3.2.2 POTENTIAL IMPACT ON ELECTRICITY PRODUCTION

10. Information on the amount of electricity generated annually by individual hydropower projects in Maine is not currently available. To develop such estimates, this analysis relies on 2006 data on the utilization of Maine's hydropower capacity.<sup>6</sup> In 2006, 766,000 KW of installed capacity at hydropower projects in Maine generated 4.3 billion KW hours of power. This is equivalent to approximately 5,614 KW hours for every KW of installed capacity. The analysis uses this figure to estimate the amount of electricity generated at the facilities of interest.
11. Under Alternative 1, the hydropower projects of interest include all those with dams located within the historic range of the Gulf of Maine DPS of Atlantic salmon. Total annual power production at these facilities is estimated at approximately 3.59 billion KW hours. Approximately 75 percent of this total (2.68 billion KW hours) is attributed to projects located on the main stems of the Kennebec, Androscoggin, or Penobscot Rivers. The remaining 25 percent (approximately 0.91 billion KW hours) is attributed to projects located elsewhere in the study area.
12. Under Alternative 2, the hydropower projects of interest include only those with dams located within the 48 occupied HUCs. Total annual power production at these facilities is estimated at approximately 1.07 billion KW hours. Approximately 88 percent of this total (946 million KW hours) is attributed to projects located on the main stems of the Kennebec, Androscoggin, or Penobscot Rivers. The remaining 12 percent (approximately 126 million KW hours) is attributed to projects located elsewhere.
13. Under Alternative 3, the hydropower projects of interest are those with dams located within the 45 HUCs in which NMFS proposes to designate critical habitat, excluding Tribal lands. Total annual power production at these facilities is estimated at approximately 1.06 billion KW hours. Approximately 89 percent of this total (946 million KW hours) is attributed to projects located on the main stems of the Kennebec, Androscoggin, or Penobscot Rivers. The remaining 11 percent (approximately 120 million KW hours) is attributed to projects located elsewhere.
14. As noted above, the designation of critical habitat is unlikely to necessitate changes in flow regimes that would significantly reduce the generation of power by dams located on the main stems of the Kennebec, Androscoggin, or Penobscot Rivers. For other dams in areas proposed for designation, changes in flow regimes that could reduce power generation might be considered. The figures cited above, however, indicate that even total elimination of power generation at these facilities would fall short of the threshold of 1 billion KW hours per year. Thus, with respect to this criterion, none of the three alternatives is likely to result in an impact that would constitute a significant adverse effect.

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<sup>6</sup> Source: Energy Information Administration, Electric Sales, Revenues, and Price, Accessed at [http://www.eia.doe.gov/cneaf/electricity/esr/esr\\_sum.html](http://www.eia.doe.gov/cneaf/electricity/esr/esr_sum.html) on February 18, 2008.

**3.3 POTENTIAL INCREASE IN THE COST OF ENERGY PRODUCTION**

15. Modifications of hydropower projects that might be undertaken for the purpose of salmon conservation or recovery would increase the cost of energy production. Such increases may result from expenditures on capital and programmatic project modifications, including the costs of installing fish passage and fish screens or conducting habitat-related research quantified in the *Economic Analysis of Critical Habitat Designation for the Gulf of Maine Distinct Population Segment of Atlantic Salmon*.
16. To determine whether the potential increase in the cost of energy production exceeds one percent, the analysis focuses on the cost of generating electrical power in Maine. Exhibit 3-1 presents cost estimates for various sources of electrical power (averages over the past four years). As this exhibit indicates, the estimated cost of power production in Maine is approximately \$545 million per year.

**EXHIBIT 3-1. POWER PRODUCTION PROFILE FOR MAINE**

FUEL TYPE	AVERAGE ANNUAL GENERATION (2003 - 2006) (KWH)	WEIGHTED AVERAGE OF TOTAL PRODUCTION	PRODUCTION COSTS (\$ / KWH)	TOTAL COSTS
Coal	345,485,485	2.3%	\$0.026	\$8,958,439
Petroleum	1,356,956,015	9.0%	\$0.026	\$35,185,869
Natural Gas	8,740,610,368	58.0%	\$0.049	\$426,760,301
Hydroelectric	3,742,982,310	24.8%	\$0.008	\$31,441,051
All Other Renewables	441,854,498	2.9%	\$0.049	\$21,573,546
Other	441,854,498	2.9%	\$0.049	\$21,573,546
<b>Total</b>	<b>15,069,743,173</b>	<b>100.0%</b>		<b>\$545,492,752</b>
Sources:				
1) Maine generation profile from Energy Information Administration, Net Generation by State by Type of Producer by Energy Source, 1990-2006.				
2) Production costs from Energy Information Administration, Electric Power Annual 2006, Released October 22, 2007: Table 8.2. Average Power Plant Operating Expenses for Major U.S. Investor-Owned Electric Utilities, 1995 through 2006.				

17. Exhibit 3-2 presents estimates of the economic impact of Alternatives 1, 2, and 3 on hydropower operations, and compares these annualized cost estimates to the overall cost of power production in Maine. As the exhibit shows, the estimated impact under Alternative 1 represents approximately 1.57 percent of the annual cost of power production. In contrast, the estimated impact under Alternative 2 is only 0.37 percent of annual power production costs, and the estimated impact under Alternative 3 is only 0.28 percent. On the basis of this comparison, the potential increase in power production costs under Alternative 1 would constitute a significant energy impact (i.e., an increase in the cost of energy production of more than one percent). Alternatives 2 and 3, however, would not have a significant effect.

EXHIBIT 3-2. POTENTIAL INCREASE IN ANNUAL POWER PRODUCTION COSTS

REGULATORY ALTERNATIVE	BASLINE ESTIMATE OF POWER PRODUCTION COSTS	ANNUALIZED ESTIMATE OF HYDROPOWER PROJECT MODIFICATION COSTS <sup>1</sup>	PROJECT MODIFICATION COSTS AS A PERCENTAGE OF TOTAL POWER PRODUCTION COSTS
Alternative 1	\$545,492,752	\$8,570,000	1.57%
Alternative 2	\$545,492,752	\$2,040,000	0.37%
Alternative 3	\$545,492,752	\$1,530,000	0.28%
<sup>1</sup> Costs annualized at 7 percent.			

18. Increases in the costs of power production may also occur if project modifications result in a reduction in the amount of electricity that hydropower projects produce. It would be necessary to offset the reduction in the production of hydropower with power from another source. Because hydropower has relatively low production costs, a shift toward other power sources would likely result in an overall increase in the cost of electricity. As previously discussed, however, the amount of hydropower generation (if any) that might be displaced as a result of critical habitat designation for the Atlantic salmon is unknown. In light of this uncertainty, the analysis estimates the amount of hydropower it would be necessary to displace in order to increase power production costs by one percent (i.e., by \$5.45 million per year).
19. The cost of offsetting reductions in the amount of hydropower generated depends on the alternative source employed. It is likely, however, that electrical generators fueled by natural gas, the most common source of electricity in Maine, would provide the replacement power. This suggests that every KW hour of hydropower lost would increase the cost of power production by approximately \$0.041 – the difference between the cost of producing electricity with hydropower and the cost of producing electricity with natural gas. Thus, shifting the generation of approximately 135 million KW hours of electricity from hydropower to natural gas would yield a \$5.45 million increase in annual power production costs.
20. It is unclear whether project modifications attributable to the designation of critical habitat would lead to a reduction in hydropower production of as much as 135 million KW hours per year. An impact of this magnitude, however, is more likely under Alternative 1 than under Alternatives 2 or 3, because designation of critical habitat under Alternatives 2 or 3 would affect fewer facilities. Under Alternative 1, a loss in hydropower production of 135 million KW hours annually would result from the loss of as little as 3.8 percent of the estimated production of potentially affected dams. In contrast, under Alternative 2, a loss of 135 million KW hours annually would equate to the loss of approximately 12.6 percent of the estimated production of potentially affected dams. Similarly, under Alternative 3, a loss of 135 million KW hours annually would

equate to the loss of approximately 12.7 percent of the affected dams' estimated production. Thus, the likelihood of a significant adverse impact on energy production is greater under Alternative 1 than under Alternatives 2 or 3.

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Personal communication with:

- Dan Kircheis, National Marine Fisheries Service.
- Jeff Murphy, National Marine Fisheries Service.



## APPENDIX A | DISTRIBUTION OF ESTIMATED IMPACTS ON SMALL ENTITIES BY HUC

HUC	ALTERNATIVE 1		ALTERNATIVE 2		ALTERNATIVE 3	
	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS
0102000101	\$0	\$44	N/A	N/A	N/A	N/A
0102000102	\$0	\$92	N/A	N/A	N/A	N/A
0102000103	\$0	\$69	N/A	N/A	N/A	N/A
0102000104	\$0	\$34	N/A	N/A	N/A	N/A
0102000105	\$0	\$63	N/A	N/A	N/A	N/A
0102000106	\$0	\$22	N/A	N/A	N/A	N/A
0102000107	\$0	\$29	N/A	N/A	N/A	N/A
0102000108	\$0	\$22	N/A	N/A	N/A	N/A
0102000109	\$0	\$215	N/A	N/A	N/A	N/A
0102000110	\$0	\$709	N/A	N/A	N/A	N/A
0102000201	\$0	\$44	N/A	N/A	N/A	N/A
0102000202	\$0	\$74	\$0	\$74	\$0	\$74
0102000203	\$0	\$311	\$0	\$311	\$0	\$311
0102000204	\$0	\$1,100	\$0	\$1,100	\$0	\$1,100
0102000205	\$0	\$1,080	\$0	\$1,080	\$0	\$1,080
0102000301	\$0	\$32,100	\$0	\$32,100	\$0	\$32,100

HUC	ALTERNATIVE 1		ALTERNATIVE 2		ALTERNATIVE 3	
	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS
0102000302	\$0	\$25,600	\$0	\$25,600	\$0	\$25,600
0102000303	\$0	\$12,500	\$0	\$12,500	\$0	\$12,500
0102000304	\$0	\$3,110	N/A	N/A	N/A	N/A
0102000305	\$0	\$11,600	\$0	\$11,600	\$0	\$11,600
0102000306	\$0	\$22,000	\$0	\$22,000	N/A	N/A
0102000307	\$0	\$592	\$0	\$592	\$0	\$592
0102000401	\$0	\$1,140	\$0	\$1,140	\$0	\$1,140
0102000402	\$266	\$1,790	\$266	\$1,790	\$266	\$1,790
0102000403	\$182,000	\$140	N/A	N/A	N/A	N/A
0102000404	\$0	\$589	\$0	\$589	\$0	\$589
0102000405	\$0	\$291	\$0	\$291	\$0	\$291
0102000406	\$0	\$1,660	\$0	\$1,660	\$0	\$1,660
0102000501	\$0	\$6,530	\$0	\$6,530	\$0	\$6,530
0102000502	\$148,000	\$2,610	\$148,000	\$2,610	\$148,000	\$2,610
0102000503	\$168	\$826	\$168	\$826	N/A	N/A
0102000504	\$0	\$122	N/A	N/A	N/A	N/A
0102000505	\$0	\$240	\$0	\$240	\$0	\$240

HUC	ALTERNATIVE 1		ALTERNATIVE 2		ALTERNATIVE 3	
	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS
0102000506	\$0	\$930	\$0	\$930	\$0	\$930
0102000507	\$0	\$474	\$0	\$474	\$0	\$474
0102000508	\$0	\$5,620	N/A	N/A	N/A	N/A
0102000509	\$0	\$881	\$0	\$881	\$0	\$872
0102000510	\$0	\$13,400	\$0	\$13,400	\$0	\$13,400
0102000511	\$0	\$8,160	\$0	\$8,160	\$0	\$8,160
0102000512	\$127,000	\$3,920	\$127,000	\$3,920	\$127,000	\$3,920
0102000513	\$0	\$44,600	\$0	\$44,600	\$0	\$44,600
0103000101	\$0	\$9	N/A	N/A	N/A	N/A
0103000102	\$0	\$31	N/A	N/A	N/A	N/A
0103000103	\$0	\$62	N/A	N/A	N/A	N/A
0103000104	\$37,700	\$21	N/A	N/A	N/A	N/A
0103000105	\$0	\$81	N/A	N/A	N/A	N/A
0103000106	\$129,000	\$44	N/A	N/A	N/A	N/A
0103000201	\$127,000	\$26	N/A	N/A	N/A	N/A
0103000202	\$0	\$16	N/A	N/A	N/A	N/A
0103000203	\$0	\$55	N/A	N/A	N/A	N/A

HUC	ALTERNATIVE 1		ALTERNATIVE 2		ALTERNATIVE 3	
	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS
0103000204	\$0	\$50	N/A	N/A	N/A	N/A
0103000301	\$0	\$93	N/A	N/A	N/A	N/A
0103000302	\$0	\$332	N/A	N/A	N/A	N/A
0103000303	\$0	\$5,550	N/A	N/A	N/A	N/A
0103000304	\$104,000	\$8,670	N/A	N/A	N/A	N/A
0103000305	\$168	\$25,700	\$168	\$25,700	\$168	\$25,700
0103000306	\$19,600	\$21,400	\$19,600	\$21,400	\$19,600	\$21,400
0103000307	\$292,000	\$4,760	N/A	N/A	N/A	N/A
0103000308	\$112	\$8,400	N/A	N/A	N/A	N/A
0103000309	\$0	\$17,800	N/A	N/A	N/A	N/A
0103000310	\$500,000	\$9,170	N/A	N/A	N/A	N/A
0103000311	\$11,500	\$34,500	N/A	N/A	N/A	N/A
0103000312	\$0	\$28,100	\$0	\$28,100	\$0	\$28,100
0104000101	\$292,000	\$519	N/A	N/A	N/A	N/A
0104000102	\$0	\$197	N/A	N/A	N/A	N/A
0104000103	\$12,800	\$790	N/A	N/A	N/A	N/A
0104000104	\$0	\$164	N/A	N/A	N/A	N/A

HUC	ALTERNATIVE 1		ALTERNATIVE 2		ALTERNATIVE 3	
	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS
0104000105	\$0	\$1	N/A	N/A	N/A	N/A
0104000106	\$0	\$131	N/A	N/A	N/A	N/A
0104000201	\$0	\$640	N/A	N/A	N/A	N/A
0104000202	\$86,400	\$8,610	N/A	N/A	N/A	N/A
0104000203	\$136,000	\$1,980	N/A	N/A	N/A	N/A
0104000204	\$159,000	\$6,220	N/A	N/A	N/A	N/A
0104000205	\$146,000	\$6,540	N/A	N/A	N/A	N/A
0104000206	\$0	\$79,700	N/A	N/A	N/A	N/A
0104000207	\$0	\$62,900	N/A	N/A	N/A	N/A
0104000208	\$0	\$20,200	N/A	N/A	N/A	N/A
0104000209	\$356,000	\$42,600	N/A	N/A	N/A	N/A
0104000210	\$129,000	\$90,600	\$129,000	\$90,600	\$129,000	\$90,600
0105000201	\$0	\$1,450	\$0	\$1,450	\$0	\$1,450
0105000203	\$0	\$3,850	\$0	\$3,850	\$0	\$3,850
0105000204	\$0	\$3,280	\$0	\$3,280	\$0	\$3,280
0105000205	\$0	\$8,870	\$0	\$8,870	\$0	\$7,940
0105000206	\$0	\$3,420	\$0	\$3,420	\$0	\$3,420

HUC	ALTERNATIVE 1		ALTERNATIVE 2		ALTERNATIVE 3	
	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS
0105000207	\$0	\$1,190	\$0	\$1,190	\$0	\$1,190
0105000208	\$0	\$3,870	\$0	\$3,870	\$0	\$3,870
0105000209	\$0	\$3,580	\$0	\$3,580	\$0	\$3,580
0105000210	\$0	\$781	\$0	\$781	\$0	\$781
0105000211	\$0	\$1,850	N/A	N/A	N/A	N/A
0105000212	\$97,300	\$3,400	\$97,300	\$3,400	\$97,300	\$3,400
0105000213	\$0	\$4,530	\$0	\$4,530	\$0	\$4,530
0105000214	\$0	\$4,900	N/A	N/A	N/A	N/A
0105000215	\$0	\$167	N/A	N/A	N/A	N/A
0105000216	\$0	\$7,570	N/A	N/A	N/A	N/A
0105000217	\$0	\$1,320	N/A	N/A	N/A	N/A
0105000218	\$507,000	\$2,200	\$507,000	\$2,200	N/A	N/A
0105000219	\$0	\$55	\$0	\$55	\$0	\$55
0105000220	\$292,000	\$2,550	N/A	N/A	N/A	N/A
0105000301	\$0	\$6,620	\$0	\$6,620	\$0	\$6,620
0105000302	\$0	\$2,580	\$0	\$2,580	\$0	\$2,580
0105000303	\$0	\$227	N/A	N/A	N/A	N/A

HUC	ALTERNATIVE 1		ALTERNATIVE 2		ALTERNATIVE 3	
	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS	ANNUALIZED IMPACTS BORNE BY SMALL HYDROPOWER OPERATORS	ANNUALIZED IMPACTS BORNE BY SMALL FARMS
0105000304	\$98	\$1,580	N/A	N/A	N/A	N/A
0105000305	\$0	\$7,140	\$0	\$7,140	\$0	\$7,140
0105000306	\$0	\$467	\$0	\$467	\$0	\$467
0105000307	\$0	\$316	\$0	\$316	\$0	\$316
N/A: Not applicable. HUC is not proposed for critical habitat designation under this alternative.						